NOTES.

M. HATT has been elected a member of the Section de Géographie et Navigation of the Paris Academy of Sciences, in succession to the late M. d'Abbadie; and Prof. de Lapparent, professor of mineralogy, geology, and physical geography in the Paris École libre des hautes études, has been elected a member of the Academy, in succession to the late M. des Cloizeaux.

WE regret to announce the death, at sixty-seven years of age, of Prof. P. Schützenberger, professor of chemistry at the Collège de France, and member of the Paris Academy of Sciences.

M. MAURICE LÉVY AND M. LÉAUTE will represent the Paris Academy of Sciences at the inauguration of the statue of Perronet at Neuilly, on Sunday next, July 4.

THE eightieth annual meeting of the Société helvétique des sciences naturelles (the Swiss Association of Naturalists) will be held at Engelberg, in the pretty Alpine village of Engelberg (Obwalden), on September 12-15. The Committee has issued a very cordial letter of invitation, in which it is pointed out that though Engelberg does not offer the resources and pleasures of a large town, or exhibit such a solid testimony to scientific movement as is seen at Zürich, where the Association met last year, nevertheless the little village at the foot of snow-capped Titlis has attractions of its own, and the welcome which will be extended to the members will be a very hearty one. The meeting will open with a reception at five o'clock in the evening of Sunday, September 12. On the following day there will be a general meeting, after which an excursion and a banquet will be the order of the day. On September 14 the sections will meet in the morning, but the afternoon and evening will be devoted to lighter pleasures. The second general meeting will take place on September 15, and the session will be closed on the same day. The railway and steamboat companies offer special facilities to members of the Association, and the charges at hotels will be reduced. The hearty invitation of the Committee, and the place of meeting (in one of the most beautiful valleys of the Alps), will doubtless attract many men of science to go with friends or families to Engelberg next September. It is hoped that those who propose to attend the meeting will notify their intention before the end of July. Letters should be addressed to the President of the Annual Committee, Herr E. Etlin, Arzt, Sarnen, Obwalden.

THE Albert Medal for the present year has been awarded, with the approval of H.R.H. the Prince of Wales, the President of the Society of Arts, to Mr. G. J. Symons, F.R.S., "for the services he has rendered to the United Kingdom by affording to engineers engaged in the water supply and the sewage of towns a trustworthy basis for their work, by establishing and carrying on, during nearly forty years, systematic observations (now at over 3000 stations) of the rainfall of the British Isles, and by recording, tabulating, and graphically indicating the results of these observations in the annual volumes published by himself."

THE annual meeting of the American Microscopical Society will be held at Toledo, Ohio, on August 5-7, under the presidency of Prof. E. W. Claypole.

IN the House of Lords on Tuesday, Lord Hobhouse moved the second reading of the Sunday Bill. The object of the Bill was to amend the Lord's Day Act of 1781, which is now being vexatiously used to repress attempts to improve the rational use of Sunday by means of lectures and musical performances. After discussion, the second reading was rejected by 50 votes to 33.

A PUBLIC meeting will be held in the Botanical Theatre of University College, Gower Street, to-morrow at 4 p.m., to inaugurate the personal memorial to the late Sir John Pender. Mr. Onslow Ford's bust of Sir John Pender will be on view, and a cheque for 5000*l.*, to endow the electrical laboratory of University College, will be handed over to the Trustees. The gift will be acknowledged by Lord Reay on behalf of the College. The Marquis of Tweeddale will preside, and Lord Kelvin is expected to be present and speak.

A COMMISSION, consisting of Prof. D. T. McDougal, of the State University of Minnesota, and Prof. Campbell, has lately visited Jamaica and other of the West Indian Islands, to select a site for an international botanical laboratory in the tropics. American botanists have long been considering the advisability and expediency of the establishment of such an institution, which, if it is founded, will be of great value as a permanent research laboratory.

THE New York Zoological Society is making special efforts to increase its membership and obtain subscriptions and endowments for the Zoological Gardens, to be established in South Bronx Park (see vol. lv. p. 613). The Society requires 250,000 dollars for the erection of animal buildings, aviaries, and other enclosures, and for the purchase of a series of mammals, birds, and reptiles with which to fill them. The sum of 100,000 dollars is urgently required, and should be obtained before August 1, as that amount must be pledged before any work on the proposed Zoological Park can begin. There ought not to be any difficulty in obtaining this amount if the rich citizens of the largest and wealthiest city in America have any public spirit.

AT Shoreditch, on Monday, Lord Kelvin opened a central electric station, in which the motive power is steam produced by a destructor which is to be fed with household refuse as fuel. From the *Times* we learn that there are twelve destructor cells, each having a grate area of twenty-five square feet, and heating six water-tube boilers working at a pressure of 200 pounds to the square inch. The chimney is 150 feet high and 7 feet in internal diameter at the top, and, in addition, there are three electrically-driven fans, which each deliver 8000 cubic feet of air a minute with a maximum ash-pit pressure of three inches of water. An interesting feature is the employment of Mr. Druitt Halpin's system of feed thermal storage. As it is necessary to keep the destructors burning continuously, steam is generated during all the twenty-four hours. But as power is required on a large scale during only a portion of that time, in order to reduce waste a plan of heat storage has been introduced, by which, during the day, steam is mixed in a vessel with cold water in such proportions that at evening the cylinder is full of water at the temperature and pressure of the steam required by the engines. The boilers are fed with this heated water, and are said to be enabled in consequence to produce one-third more steam than they would if working with water direct from the mains. As to the amount of refuse consumed, it is expected that the most efficient rate will be between eight and twelve tons a day. The electrical plant at present consists of three generators working at 1100 volts, and three low-tension dynamos at 165 volts. All are driven by Willans' three-crank engines, coupled direct. Orders have already been received to nearly the full capacity of the present plant. In declaring the undertaking ready for public use, Lord Kelvin said that it was worthy of the Victorian era as an example of the combination of scientific forethought, mechanical skill, and courage, which had nothing of gambling in it, but simply brought into practice recognised engineering possibilities. Dust destructors have been tried for some years in order to get quit of refuse at a lower cost than is required for spreading it on the ground or carrying it out to sea, but little has been done in the way of using the heat of these dust-crematories for raising steam. Shoreditch is the pioneer vestry in this respect. But what has been done is only the small beginning of what will be a much greater thing, for all dust refuse will soon be used in the same way.

THE firing at Portsmouth on Saturday, on the occasion of the naval review, was distinctly heard at Hungerford, Wilts, a distance of forty-five miles, as the crow flies, and also at Great Malvern. It would be interesting to know whether the salutes were heard at greater distances than these.

IN accordance with the will of the late Prof. E. D. Cope, his collection of fossils is to be sold, and the proceeds devoted to establishing a chair of Palæontology in the Philadelphia Academy of Sciences, with which his name was so closely connected. The appointment to the chair must be approved by the National Academy, the duty being chiefly that of original research.

IT may interest some of our readers to know that the following are among the portraits recently acquired by the Trustees of the National Portrait Gallery:—Sir Francis Ronalds (1788-1873), inventor of the first working electric telegraph. A small plaster bust of Richard Jefferies (1848-1887), naturalist and author. A painting of Constantine Phipps, Lord Mulgrave, R.N. (1744-1792), represented in the Arctic regions while commander of H.M.S. *Racehorse* in 1773 on a voyage to the North Pole. Sir Joseph Williamson, P.R.S. (1630-1701), Secretary of State in 1674, and second President of the Royal Society.

A THUNDER-STORM of extraordinary violence passed over London on Thursday last, and did an immense amount of damage in Essex, every kind of crop over an area of about a hundred square miles being ruined. A description of the storm will be found in our correspondence columns. Hailstones of unusually large size fell during the thunder-storm. Mr. F. E. Allhusen, writing from Harrow-on-the-Hill, sends us a description of hailstones which fell there at about 1.50 p.m. The hail continued for about twenty minutes, and was followed by heavy rain. Referring to a number of hailstones picked up and examined within five minutes of their fall, Mr. Allhusen says:—"The majority were roughly spherical in shape, and had an opaque nucleus about the size of a pea. Round this there was a layer of clear ice, in several distinct concentric layers. The ice was honeycombed with small air-bubbles, arranged radially; many of these air-bubbles were much elongated. The general appearance of the hailstones was rough, and somewhat similar to that of the edible part of a walnut. . . . Twelve fairly large stones were weighed; they turned the scale at two ounces."

MR. J. A. MCMICHAEL, Head-master of the Technical Day School, Chester, informs us that on Sunday evening, June 20, at 7.45, he saw a distinct solar halo. The angle subtended by its radius was roughly estimated at 25°. No second halo was visible. The colours were easily seen, the red being inside. Mr. McMichael thinks the appearance of such a phenomenon four days before Midsummer Day is very remarkable, and would like to know if any of our readers could give similar instances.

IT is stated in *Science* that a Bill has been introduced in the Minnesota Legislature providing for the appointment of expert witnesses, and that a similar Bill has been prepared to be presented to the New York Legislature. The object of the Bill is to provide a list of experts from whom witnesses are to be selected by the Court and paid by the State. The following remark of our Transatlantic contemporary will find many supporters:—"The employment of expert witnesses by the counsel for the prosecution or defence has been unfortunate both for the Courts and for science. It would certainly be desirable to devise a plan by which the expert witness should be in the position of a judge rather than that of a paid attorney."

THE number and variety of scientific exploring expeditions in America this summer is surprising. The latest announcement is that Prof. Wm. Libbey, jun., of Princeton University, will in a few days lead a party of six explorers to Albuquerque, New Mexico, to explore a mesa or sandstone tableland near there. The outcroppings of red sandstone project from the face of the walls, rendering it almost inaccessible. Cliff dwellings have been seen along the edges, and fragments of pottery at the base indicate occupancy by a pre-historic race; but the tableland has never been scaled in historic times, so far as known. Prof. Libbey intends to throw a line over this tableland, which is several acres in extent on top, by means of tandem kites; or, in case the wind should be too light, by means of a mortar which will fire a life line across the top. Larger lines will be drawn over, and the ascent made in a boatswain's chair.—Mr. Jesse D. Grant, son of General Grant, is sending an expedition to explore the islands in the Gulf of California, north of 29°, which parallel intersects Tiburon Island, inhabited by the fierce and little-known cannibal Ceris Indians.

TWO exploring expeditions are now on their way to Mount St. Elias—one from the United States, the other from Italy. The object of the American expedition is to make a survey of the region, and settle the boundary dispute with Great Britain. The 141st meridian of west longitude is the boundary line, and the summit of the mountain was found by the commission appointed in 1891 to be approximately 60° 17′ 51″ N. and 140° 55′ 30″ W. It is said to be thirty-three miles inland, whereas the jurisdiction of the United States extends ten marine leagues or 34¼ miles; thus, it would seem, taking in the summit. Mr. E. B. Tatham, of the United States Coast Survey, will conduct this work. The party will be led by Mr. Henry G. Bryant, of Philadelphia, who explored the great falls of Labrador in 1891, and was leader of the Peary Auxiliary Expedition in 1894. Mr. Samuel J. Enterkin, who goes with the party, was with the Peary party on its journey to the ice cap in March 1894.

THE Italian expedition to Mount St. Elias is led by Prince Luigi Amadio of Savoy, who is accompanied by four aides, Chevaliers M. Cagni, Francesco Gonella, Vittoria Sella, and Dr. Filippo De Filippi. After the ascent, this party will attempt to climb Logan's Peak. Mount St. Elias is over 18,000 feet high, and was for a long time considered the highest mountain on the American continent. The summit has never been reached, though several attempts have been made, notably in 1891, when the surveying party reached the height of 14,500 feet. The reason of the failure of former parties is said to be that the approach was made on the south side, where there is a heavy fall of snow and tremendous avalanches, glaciers, precipices, and chasms. The northerly side, from which the ascent will now be attempted, is more approachable, owing to a long ridge of mountains.

WE learn with regret that Mr. W. J. C. Millar has been compelled by ill-health to resign the post of mathematical editor of the *Educational Times*, which he has held for the past forty years. Mr. Millar's labours have been purely honorary, and his collections of problems and mathematical riddles have inspired and directed the early efforts of many mathematicians of the highest eminence, including such names as Clifford, Cockle, Cayley, and Sylvester. It is now proposed to present Mr. Millar with a testimonial in recognition of his services, and towards this purpose 40*l.* has been already received. The Rev. Robert Harley, F.R.S., of "Rosslyn," Westbourne Road, Forest Hill, S.E., has kindly undertaken to receive contributions, which it is hoped will be "*numerous* rather than *large*," the object being to show Mr. Millar how widely his work has been appreciated.

IT is somewhat remarkable that, although the conception of the centre of gravity was evidently known to Archimedes, those of his writings which have been handed down to us nowhere contain either a definition or a proof of the existence of that point. This gap has been attributed to his having treated the subject in a lost work on balances, quoted by Pappus. An important contribution to our historical information has now been made by Dr. Giovanni Vailati (*Atti della R. Accademia delle Scienze di Torino*, xxxii.), who has found fresh material in an Arabic translation of an unknown work by Hero, of Alexandria, in the library of Leyden. This work was brought over in the seventeenth century by Golius, then Professor of Mathematics and of Oriental Languages in the University of Leyden, and attention has recently been directed to it by Carra de Vaux. In it Hero makes numerous references to Archimedes' lost manuscript, from which Dr. Vailati has been enabled to build up, with a fair degree of certainty, the arguments by which Archimedes proved the existence of the centre of gravity.

DR. F. CAMPANILE and Dr. E. Stromei (*Rendiconti dell'Accademia delle Scienze di Napoli*, iii. 4) describe some further experiments on the phenomena of phosphorescence observed by them in Crookes and Geissler tubes. This phenomenon consists in the production of phosphorescence and Röntgen rays on the walls of a Geissler tube opposite two plates of tinfoil which were attached to a Ruhmkorff coil or to an electrostatic machine, connected with a spinterometer.—A somewhat different line of investigation has been taken up by Prof. Battelli (*Nuovo Cimento*, v., March 1897), who has studied the variations in the photographic action both inside and outside a vacuum tube, and their dependency on the form and dimensions of the tube, the form of the electrodes, the intensity of the current, and the degree of rarefaction.—In a subsequent number of the *Nuovo Cimento*, Signor P. G. Melani discusses the influence of magnetism on discharges in vacuum tubes, and describes a number of experiments carried out in Prof. Battelli's laboratory at Pisa.

ALONG with a fine series of reptiles lately presented to the Zoological Society's collections, Mr. F. W. Urich has sent from Trinidad a nest of the "Sauba" or Parasol Ant, *Œcodoma cephalotes*, the extraordinary habits of which are well known to naturalists. The colony has been placed in a glass case in the Zoological Society's Insect House, where the workers may be seen every day cutting out bits of leaves from a plant that has been provided for their use, and conveying them into their subterranean dwellings.

A NEW Tortoise House, placed near the Reptile House, has just been completed in the Zoological Society's Gardens, and the various specimens of the *Testudinata* will shortly be removed there from their present quarters on the further side of the canal, so that the whole of the reptile collection will be together. The most remarkable of the tortoises are two fine adult specimens of the Giant Tortoise of the Aldabra Islands in the Indian Ocean, which were presented to the Society by Rear-Admiral Kennedy in 1894. There are also three other examples of the same, or of a nearly-allied species, which have been recently received "on deposit" from the Hon. Walter Rothschild.

AUTHORITIES on Indian birds seem to be unanimous in the opinion that the common little Cotton-Teal or Goose-Teal, *Nettopus coromandelianus*, is unable to stand and walk like other ducks, but invariably flutters along in a strange scuffling manner, like a wounded bird. At a recent meeting of the Asiatic Society of Bengal, Mr. F. Finn gave reasons for doubting the accuracy of this statement. He has had many opportunities of observing Cotton-Teal in confinement, and after watching the gait and movements of numerous specimens, he asserts that the inability to walk, attributed to the species by many observers, is not in reality natural to it, but merely the result of fright, weakness, or injury.

Science Gossip for June reproduces from the *Journal of Malacology* some very interesting sciagraphs of shells by Mr. W. M. Webb, which seem to show that the Röntgen rays are of practical value for studying their interior structure. In a paper read before the Natural History Society of Buda-Pesth, Dr. J. Istvánffy states that, in the case of living plants, the Röntgen rays penetrate only the woody tissue. In a leaf of *Camellia* exposed to them, the veins appeared white. All other tissues, whether containing chlorophyll or not, are impenetrable to them.

WE are glad to see that the *Gleaner*, of Kingston, Jamaica, is urging the appointment of a geologist to examine the new sections which will be exposed during the construction of a new road now being made over the mountains. The palæontology of Jamaica has been very little studied. There is a very poor collection of fossils in the local museum. It is a little better with mineralogy, but so slight has been the interest taken in all branches of geological science that there are both fossils and minerals from local sources in the museum, about which there is absolutely nothing known; all trace of their origin and other circumstances having been lost. What is really wanted is a Government geologist, to devote himself exclusively to geological observations; and if the appointment of such an officer cannot be entertained at present, the least that should be done is to commission a geologist to map the sections which the road-builders will expose, and save whatever vestiges of vanished ages may be obtained. The facts thus accumulated would be of the greatest value when a survey of the country comes to be made.

MESSRS. GINN AND CO. will shortly publish the first number of the *Zoological Bulletin*, a companion serial to the *Journal of Morphology*, and designed for shorter contributions in animal morphology and general biology. The *Bulletin* will differ from its German prototypes chiefly in excluding, at least for the present, bibliographical lists. Its contents will consist wholly of scientific communications. The editorial work will be directed by Profs. C. O. Whitman and W. M. Wheeler.

IN connection with the excursion of the Geologists' Association to Edinburgh, from Monday, July 26, to Saturday, July 31, the four following papers will be read at a meeting of the Association at University College, London, to-morrow, July 2, at 8 o'clock:—"Outline of the Geological History of the Rocks around Edinburgh," by Mr. J. G. Goodchild; "Excursions from Bathgate to Linlithgow, and from St. Monans to Elie," by Prof. James Geikie, F.R.S.; "Fish Remains in the Abden Bone-bed," by Dr. R. H. Traquair, F.R.S.; "The Stirling District," by Mr. H. W. Monckton.

THE Report of the Government Observatory, Colába, Bombay, for the year ended March 31 last, presents two special points of interest: (1) The introduction of a Dines' pressure tube anemometer, the vane of which is erected about 3 feet above the cups of the Robinson anemometer, and about 6 feet from it. A comparison of the results of the two instruments during the short period of the erection of the new anemometer shows that the average velocity recorded by the old instrument is 42 per cent. more than the average velocity given by the

Dines' anemometer, confirming the results of other observers that the factor 3 (the ratio of the speed of the wind to that of the cups) is too great. (2) The Director is able to report a clean bill of health in his little colony (numbering altogether about 100 persons, including servants and their families) during the plague epidemic. This satisfactory state is attributed to additional ventilation, by removal of tiles, &c., to fumigation twice a week by carbolic acid, to inoculation of every man, woman, and child with Dr. Haffkine's prophylactic serum, and to the daily inspection of the quarters and inmates.

THE additions to the Zoological Society's Gardens during the past week include a Servaline Cat (*Felis servalina*) from East Africa, presented by the Rev. Ernest Millar; a Vulpine Phalanger (*Trichosurus vulpecula*) from Australia, presented by Mr. M. A. Murray; a Common Squirrel (*Sciurus vulgaris*), British, presented by Lady Acland Hood; two Bateleur Eagles (*Helotarsus ecaudatus*), two Common Herons (*Ardea cinerea*) from East Africa, presented by Mr. Chas. Palmer; a Red-crested Cardinal (*Paroaria cucullata*) from South America, presented by Miss Edith M. Kenyon Welch; a Grey Monitor (*Varanus griseus*) from Egypt, presented by Dixon Bey; two Natal Pythons (*Python sebæ*, var.) from Natal, presented by the Hon. R. Carnegie; an Orang-outang (*Simia satyrus*, ♂) from Sumatra, deposited; two King Penguins (*Aptenodytes pennanti*) from the Antarctic Seas, purchased; a Burchell's Zebra (*Equus burchelli*, ♀), a Japanese Deer (*Cervus sika*, ♀), two Glossy Ibises (*Plegadis falcinellus*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN.

PERSONAL EQUATIONS IN TRANSIT OBSERVATIONS.—In the reduction of transit observations the question of personal equation is an important factor in the accuracy of the final star places, and it is on this account that investigations are always being pursued to determine the values of these equations for each meridian observer. A communication of importance in this respect appears in the *Monthly Notices* for May, by Prof. Truman Safford, who treats of the various forms of personal equation in transit observations which arise from the non-observance of the exact time of transit due to personality, magnitude of the star observed, and the apparent velocity and direction of movement. In his investigation Prof. Safford concludes that since the year 1795 most eye and ear observers anticipate the true time of transits, taking the average observed as a standard. At Greenwich, since 1885, the great majority of observers by the eye and ear method anticipate the time of their own chronographic transits, while the average chronographic observer registers transits after the time of their occurrence by an amount not greatly different from that which is required to register an impression on the senses. The personal error arising from the rate of movement of the star, or as it is termed the polar equation, amounts sometimes to a very considerable quantity, and several values are given in the paper showing the importance of a strict elimination of this variable. Dealing with faint stars an observer using the chronographic method registers its time of transit later than that when a more bright one is taken, while with the eye and ear method the time of transit is generally somewhat earlier. The change in direction of motion of stars due to their being observed sometimes north and sometimes south of the zenith, gives rise to a further personal equation discovered by Dr. Gill, but which is found generally very small. The investigation shows that the general theory thrown out by Bessel is thus confirmed, and Prof. Safford points out that the same is true with regard to Wundt's explanation of the eye and ear process from a psychological point of view.

PARIS OBSERVATORY REPORT.—In his annual report for the year 1896, M. Lœwy, after a brief reference to the loss the observatory sustained in the death of M. Tisserand, sums up the work of the past twelve months. Among some of the chief points to which reference is made, may be mentioned the two astronomical congresses that have been held at the Observatory, and the work connected with the great enterprise of the photographic chart of the heavens. Many of the difficulties connected with the latter have for the great part been overcome, but there still remain one or two important questions which have been left over for another meeting. M. Bigourdan's work on the determination of the accurate position of the nebulæ between declination 90° and − 30° has made great progress, and it is expected that it will take him three years more to complete the whole region under survey. The work on the photographic atlas on the moon has been successfully continued, and besides the issue of the first portion of the atlas during the past year, a second one will be published in the present one. The report further gives a brief account of M. Deslandres' work on the motions of stars in the line of sight, and the results of the expedition to Japan to observe the solar eclipse of August last. The work done in other departments of the observatory during last year, such as the Bureau des Calculs, Service Meridien, &c., is also briefly described.

BELGIAN TIME-RECKONING.—Since the beginning of May, the hours in Belgium have been reckoned from 0 to 24, noon being represented by 12, and midnight by 0 or 24, according to circumstances. In the case of a train starting exactly at midnight, it is said to leave at 0 hour; and one arriving exactly at midnight is considered due at 24 hours, or, as we should say, at 24 o'clock. We learn from the *Journal* of the Society of Arts that on the time-tables the times between midnight and 1 a.m. are indicated by a zero, followed by a point and the letter H, the latter followed in turn by the number of minutes. The dials of existing clocks at railway stations are completed by the figures 13, 14, 15, &c., to 24, added below the existing figures of 1, 2, 3, &c., to 12. This change, which should have come into force with the new year, was deferred for three months, on account of the administrative difficulties which it involved, and also in the hope that the Greenwich meridian, now adopted in Belgium, might also be accepted by France at the same time, urgency having been voted for a measure to that effect by the Chamber of Deputies.

A NEW CLASSIFICATION OF STELLAR SPECTRA.[1]

MANY of the recent advances in our knowledge of the constitution of the stars are traceable to Prof. Pickering's revival of Fraunhofer's mode of investigating stellar spectra. The endowment of this research by Mrs. Draper as a memorial to her husband, Dr. Henry Draper, has enabled Prof. Pickering to apply this method in two principal directions. First, a series of photographs was taken on a small scale to indicate the chief characteristics of the spectra of a very great number of stars; second, in the case of the brighter stars, another series was taken with greater dispersion with the view of facilitating an inquiry into the more minute features of each type of spectrum. The results of the first investigation are comprised in the well-known "Draper Catalogue," giving particulars of the spectra of over 10,000 stars (NATURE, vol. xlv. p. 427), and the research has now been advanced another stage by the publication of the results obtained along the second line of inquiry.

The new series of photographs has been taken with one to four objective prisms of 15° each in conjunction with the 11-inch Draper telescope of 153 inches focal length.

When four prisms were employed, the spectra were 8 centimetres long from H_β to H_ϵ, and with one prism 2 centimetres. Since only the brighter spectra could be photographed with the highest dispersion, some of the more typical of these were also photographed with one and two prisms in order to give a proper term of comparison with the spectra of the fainter stars. In all, 4800 photographs of the spectra of 681 of the brighter stars north of declination − 30° are included in the present discussion. By the use of plates stained with erythrosin the spectra of several stars have been photographed in the green and yellow.

As in all previous work involving considerable numbers of stellar spectra, it has been found that the spectra can be classified in large groups, between which there are intermediate varieties. "Large numbers of almost identical spectra are found, even when several hundred lines appear in each." The description of the spectra accordingly takes the form of an account of typical stars in the scheme of classification adopted, accompanied by tables of the lines which characterise the larger groups. No

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[1] Spectra of bright stars, photographed with the 11-inch Draper telescope as a part of the Henry Draper Memorial, and discussed by Antonia C. Maury, under the direction of Edward C. Pickering. (*Annals of Harvard College Observatory*, vol. xxviii. part 1, 1897.)